greater than 3 μm, the amount of moisture absorption to the periphery of the inorganic filler can be reduced to allow the moisture resistance to be improved and allow the amount of the inorganic filler to be increased, facilitating the film formation (solidification). Furthermore, the coefficient of linear expansion of the anisotropic conductive layer of, for example, the anisotropic conductive film sheet or the anisotropic conductive film forming adhesive can be reduced, allowing the operating life to be increased, for the improvement in reliability.

Furthermore, if the one inorganic filler of the larger mean particle diameter is made of a material identical to the aforementioned insulating resin, then the stress alleviating effect can be produced. If the inorganic filler of the larger mean particle diameter is made softer than the epoxy resin that serves as the insulating resin and the one inorganic filler is compressed, then the stress alleviating effect can also be produced.

Moreover, if the inorganic filler is not existing or reduced in amount in the bonding interface between the electronic component or the board and the anisotropic conductive layer, the innate adhesion of the insulating resin is effected. This increases the insulating resin of high adhesion in the bonding interface, allowing the adhesion strength of the electronic component or the board

and the insulating resin to be improved and improving the adhesion of the insulating resin to the electronic component or the board with the effect of reducing the coefficient of linear expansion by the inorganic filler kept intact. With this arrangement, the operating life is improved during a variety of reliability tests, and the peel strength to bending is improved.

Furthermore, by employing an insulating resin, which improves the adhesion to the film material used on the surface of the electronic component in the portion or layer brought in contact with the electronic component and employing the insulating resin, which improves the adhesion to the material of the board surface, in the portion or layer brought in contact with the board, the adhesion can further be improved.

As described above, according to the present invention, there can be provided the method and apparatus for bonding electronic components to boards with high productivity and high reliability without needing the resin encapsulating process to pour resin between the electronic component and the board and the bump leveling process for regulating the bump height constant after the bonding of the electronic component to the circuit board.

(Sixteenth Embodiment)

A method and apparatus for mounting an electronic

component of, for example, an IC chip on a circuit board and an electronic component unit or module of, for example, a semiconductor device in which the IC chip is mounted on the board by the mounting method, according to a sixteenth embodiment of the present invention will be described below with reference to Fig. 38A through Fig. 51.

The method for mounting an IC chip on a circuit board according to the sixteenth embodiment of the present invention will be described first with reference to Fig. 38A through Fig. 41C. Bumps (protruding electrodes) 3 are formed on Al pad electrodes 2 of an IC chip 1 that serves as one example of the electronic component of Fig. 38A by a wire bonding device through the operation shown in Fig. 40A through Fig. 40F. That is, a ball 96 is formed at the lower end of a wire 95 protruding from a capillary 93 that serves as a holder in Fig. 40A, and the capillary 93 that is holding the wire 95 is lowered in Fig. 40B so as to bond the ball 96 to the electrode 2 of the chip 1, roughly forming the shape of the bump 3. By making the capillary 93 start to move up while downwardly feeding the wire 95 in Fig. 40C, moving the capillary 93 in an approximately rectangle-shaped loop 99 as shown in Fig. 40D to form a curved portion 98 on the upper portion of the bump 3 as shown in Fig. 40E and tear off the wire, the bump 3 as shown in Fig. 40F is formed. Otherwise, by clamping the